

Residential Requirements for the 2009 IECC

Workshop 2:

Focus on Additions/Remodels and Implementation





Introductions

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Project email:

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Code officials:

Name

Municipality

Status of Residential Codes



Overview

Project funded by the Missouri Department of Natural Resources (MDNR) with American Recovery and Reinvestment Act of 2009 (ARRA) funding.

2 Locations:

- St. Louis
- Springfield

Objective of the Workshop: Work with municipalities and counties across the state to identify opportunities to adopt or enhance compliance with the 2009 International Energy Conservation Code (IECC) at a local level.





Agenda

Topic	Approx. Time
Introduction, Project Background, Workshop Overview	15 minutes
Residential Remodels and Additions for 2009 IECC	45 minutes
Break	15 minutes
Tools to enhance compliance	45 minutes
Summary/Questions/Next Steps	10 minutes
Total	2 hours 10 minutes



Some Important Points

Overall

- Focused on residential
- Discussion-based
- Forum for ideas and practices

What can you expect?

- Code citations in []
- Printed slides
- Links to Department of Energy and Building Codes Assistance Program (BCAP) resources

Before we get started...

Cell phones





Topic 1

Residential Remodels and Additions for 2009 IECC





Topic 1 Objectives

- Identify how additions/alterations/repairs trigger the 2009 IECC
- Identify the compliance paths for residential additions





Remodels and additions

- What activity triggers the code?
- Definitions
- Exceptions

101.3 Intent. This code shall regulate the design and construction of buildings for the effective use of energy. This code is intended to provide flexibility to permit the use of innovative approaches and techniques to achieve the effective use of energy. This code is not intended to abridge safety, health or environmental requirements contained in other applicable codes or ordinances.



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What Triggers the 2009 IECC?

101.4.3 Additions, alterations, renovations or repairs. Additions, alterations, renovations or repairs to an existing building, building system or portion thereof shall conform to the provisions of this code as they relate to new construction without requiring the unaltered portion(s) of the existing building or building system to comply with this code. Additions, alterations, renovations or repairs shall not create an unsafe or hazardous condition or overload existing building systems. An addition shall be deemed to comply with this code if the addition alone complies or if the existing building and addition comply with this code as a single building.

Exception: The following need not comply provided the energy use of the building is not increased:



Overview

8 Exceptions

- 1. Storm windows installed over (E) window.
- 2. Glass only replacements in an (E) window.
- 3. (E) cavities are filled with insulation.
- 4. (E) cavity is not exposed.
- 5. Roofing for roofs were neither the sheathing nor the insulation is exposed.
- 6. Replacement of (E) doors that

- separate conditioned space from the exterior shall not require the installation of a vestibule or revolving door.
- 7. Alterations that replace less than 50% of the luminaires in a space.
- 8. Alterations that replace only the bulb and ballast w/in the (E) luminaires in a space.

The IECC "is not intended to abridge safety, health or environmental requirements contained in other applicable codes or ordinances."







What's an addition?

ADDITION. An extension or increase in the *conditioned space* floor area or height of a building or structure.

What's conditioned space?

CONDITIONED SPACE. An area or room within a building being heated or cooled, containing uninsulated ducts, or with a fixed opening directly into an adjacent *conditioned space*.

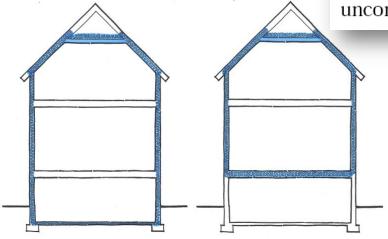


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What Triggers the 2009 IECC?

What's building thermal envelope?

BUILDING THERMAL ENVELOPE. The basement walls, exterior walls, floor, roof, and any other building element that enclose *conditioned space*. This boundary also includes the boundary between *conditioned space* and any exempt or unconditioned space.









What's an alteration?

ALTERATION. Any construction or renovation to an existing structure other than repair or addition that requires a permit. Also, a change in a mechanical system that involves an extension, addition or change to the arrangement, type or purpose of the original installation that requires a permit.

What's a repair?

REPAIR. The reconstruction or renewal of any part of an existing building.





101.4.5 Change in space conditioning. Any nonconditioned space that is altered to become *conditioned space* shall be required to be brought into full compliance with this code.





What's a sunroom?

SUNROOM. A one-story structure attached to a dwelling with a glazing area in excess of 40 percent of the gross area of the structure's exterior walls and roof.









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What Triggers the 2009 IECC?

402.2.11 Thermally isolated sunroom insulation. The minimum ceiling insulation *R*-values shall be R-19 in Zones 1 through 4 and R-24 in Zones 5 through 8. The minimum wall *R*-value shall be R-13 in all zones. New wall(s) separating a sunroom from *conditioned space* shall meet the *building thermal envelope* requirements.

TABLE 402.1.1
INSULATION AND FENESTRATION REQUIREMENTS E

CLIMATE ZONE	FENESTRATION U-FACTOR ^b	SKYLIGHT ^b <i>U</i> -FACTOR	GLAZED FENESTRATION SHGC ^{b, e}	CEILING R-VALUE	WOOD FRAME WALL R-VALUE	MA WA R-VA
4 except Marine	0.35	0.60	NR	38	13	5/





402.3.5 Thermally isolated sunroom *U*-factor. For Zones 4 through 8, the maximum fenestration *U*-factor shall be 0.50 and the maximum skylight *U*-factor shall be 0.75. New windows and doors separating the sunroom from *conditioned space* shall meet the *building thermal envelope* requirements.

INSULATION AND FENESTR

CLIMATE ZONE	FENESTRATION U-FACTOR ^b	SKYLIGHT ^b <i>U</i> -FACTOR	GLAZED FENESTRATION SHGC ^{b, e}	CEII
4 except Marine	0.35	0.60	NR	3





Which items trigger examination of the energy code?

Home expansion

Yard fence

New skylight while re-roofing

Detached garage

Attached garage

Bedroom addition

New sunroom

Window replacement

New concrete driveway

Furnace replacement







Which items require a permit in your municipality?

Home expansion

Yard fence

New skylight while re-roofing

Detached garage

Attached garage

Bedroom addition

New sunroom

Window replacement

New concrete driveway

Furnace replacement







Which of the following must comply with the residential provisions of the IECC?

- A. unconditioned garage
- B. thermally isolated sunroom
- C. open-air, unconditioned backyard gazebo structure
- D. unconditioned attic

Which of the following is exempt from the provisions of the IECC?

- A. A 100 SF bathroom addition to your neighbor's home
- B. My home which I plan to only heat to 64°F
- C. A conditioned garage addition
- D. A historic home located in a locally designated historic district





Topic 1 Objectives

- Identify how additions/alterations/repairs trigger the 2009 IECC
- Identify the compliance paths for residential additions





Compliance Paths for Additions

101.4.3 Additions, alterations, renovations or repairs

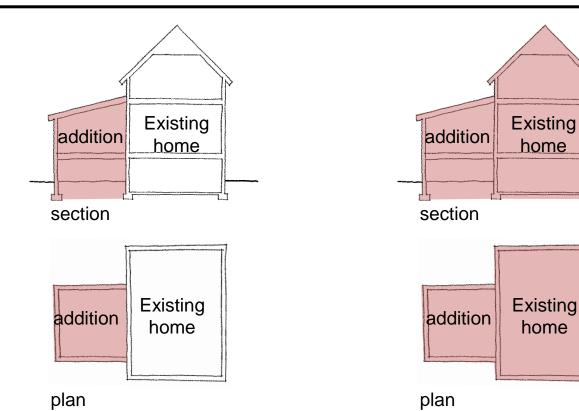
101.4.3 Additions, alterations, renovations or repairs.

Additions, alterations, renovations or repairs to an existing building, building system or portion thereof shall conform to the provisions of this code as they relate to new construction without requiring the unaltered portion(s) of the existing building or building system to comply with this code. Additions, alterations, renovations or repairs shall not create an unsafe or hazardous condition or overload existing building systems. An addition shall be deemed to comply with this code if the addition alone complies or if the existing building and addition comply with this code as a single building.



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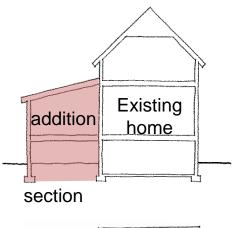
Compliance Paths for Additions

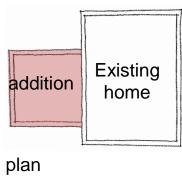






Compliance Paths for Additions









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Compliance Paths for Additions

Prescriptive

B.1 **U-Factor**

Prescriptive Approaches

UA Alternative B.2

Simulated Performance Alternative

REScheck Simulated Performance requires structure with four walls with unique orientation, and at least one roof and one floor.





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Compliance Path – Prescriptive

TABLE 402.1.3 EQUIVALENT *U*-FACTORS^a

CLIMATE ZONE	FENESTRATION U-FACTOR	SKYLIGHT <i>U</i> -FACTOR	CEILING <i>U</i> -FACTOR	FRAME WALL <i>U</i> -FACTOR	MASS WALL U-FACTOR ^b	FLOOR <i>U</i> -FACTOR	BASEMENT WALL UFACTOR	CRAWL SPACE WALL U-FACTOR ^C
1	1.20	0.75	0.035	0.082	0.197	0.064	0.360	0.477
2	0.65	0.75	0.035	0.082	0.165	0.064	0.360	0.477
3	0.50	0.65	0.035	0.082	0.141	0.047	0.091°	0.136
4 except Marine	0.35	0.60	0.030	0.082	0.141	0.047	0.059	0.065
5 and Marine 4	0.35	0.60	0.030	0.057	0.082	0.033	0.059	0.065
6	0.35	0.60	0.026	0.057	0.060	0.033	0.050	0.065
7 and 8	0.35	0.60	0.026	0.057	0.057	0.028	0.050	0.065

Marine	0.55	0.00	1410	30	10	5/10	10	10/13	10, 210	10/13
5 and Marine 4	0.35	0.60	NR	38	20 or 13+5h	13/17	30g	10/13	10, 2 ft	10/13
6	0.35	0.60	NR	49	20 or 13+5h	15/19	30g	15/19	10, 4 ft	10/13
7 and 8	0.35	0.60	NR	49	21	19/21	38g	15/19	10, 4 ft	10/13

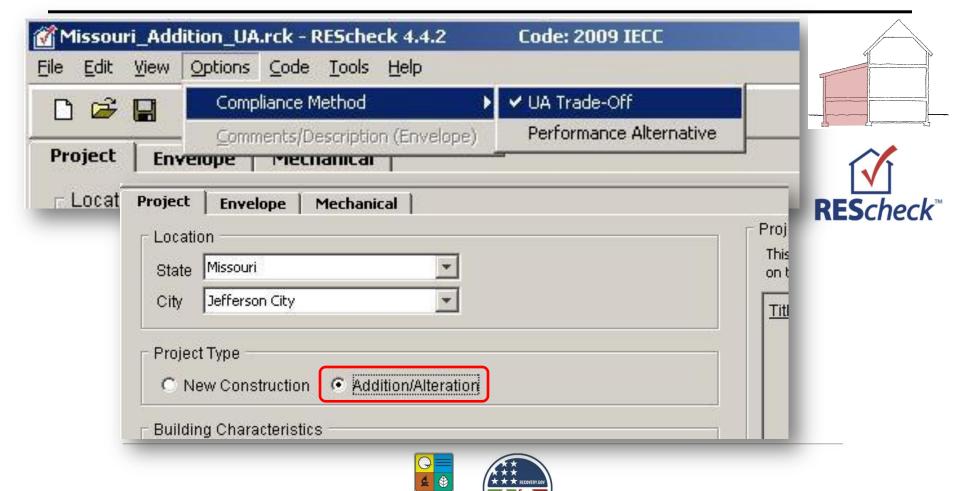




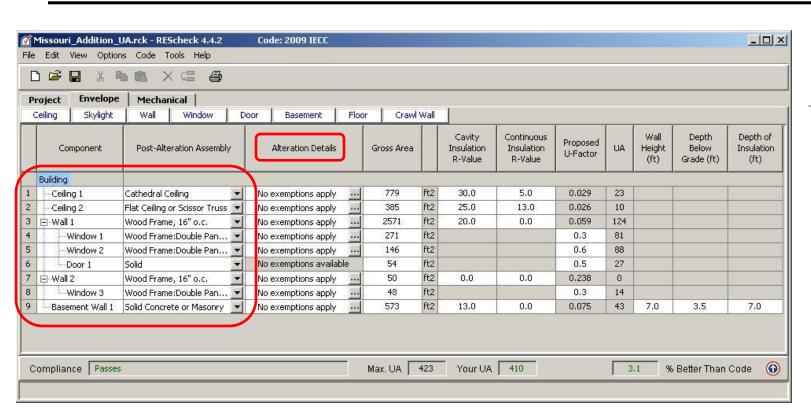
RAWL PACE^C VALL /ALUE

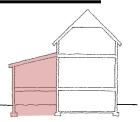


Compliance Path – Prescriptive



Compliance Path – Prescriptive



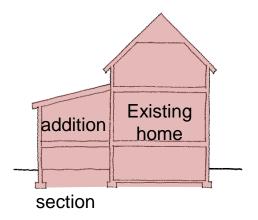


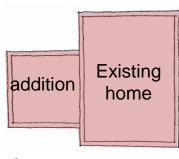






Compliance Paths for Additions





plan



Compliance Paths for Additions

A. Prescriptive

B.1 U-Factor

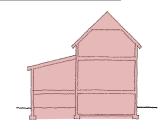
Prescriptive Approaches

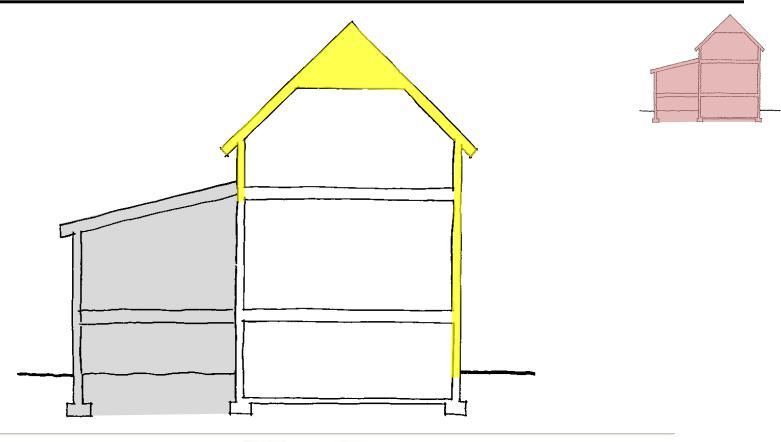
B.2 UA Alternative

C. Simulated Performance Alternative

REScheck Simulated Performance requires structure with four walls with unique orientation, and at least one roof and one floor.



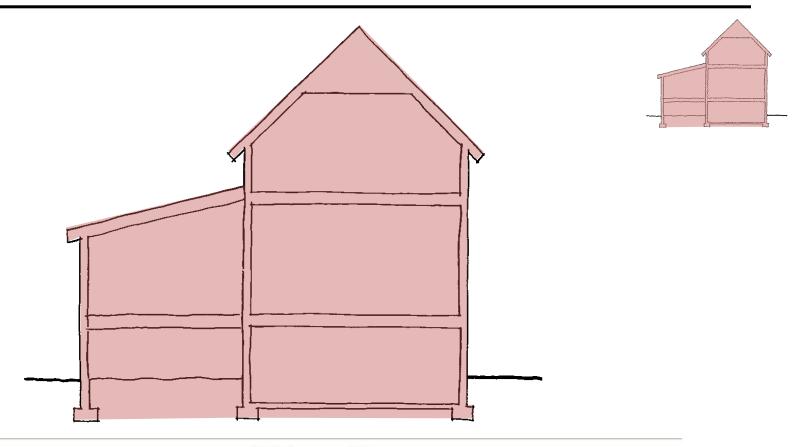








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FILE SECURITION NATURAL RESOURCES

REScheck[™]





ENERGIZE VISSOURI DEPARTMENT OF NATURAL RESOURCES

	lome_REM.blg	2009 IECC ANNUAL ENERGY COST COMPLIANCE				
ile Building View Extras Li	braries Reports Tools Help	Building Name:	Date:	·		
Slab Floor Properties Summary		Owner's Name: Property Address:	Builder's Name: Weather Site: File Name:			
1		-	A	nnual Energy Cost (\$)		
# Name Type	Area Depth Full Per		2009 IECC	As Designed		
Slab R-10 Perimete	r 1191 3.0 195	Heating:	583	564		
		Cooling:	96	96		
		Water Heating:	108	108		
		SubTotal - Used to Determine Compliance	788	768		
		Lights & Appliances:	592	592		
1		Photovoltaics:	-0	-0		
New	Delete Copy	Service Charge:	120	120		
 -		Total:	1500	1480 *		
Name: Slab Type: R-10 Perimeter	R-10.0 Per ▼	Home infiltration per Section 402.4.2: Duct Leakage per Section 403.2.2:		PASSES PASSES		
Area (sq.ft): 1191	Full Perimeter (ft):		uirements and verifications of Section 405 of the 2 of 4A. In fact, this home surpasses the requiremen			
Depth Below Grade (ft): 3.0	Total Exposed Perimeter (ft):	Name:	Signature:			
(0 if on-grade)		Organization:	Date:			
(c i vi gloss)	On-Grade Exposed Perimeter (ft): 0		.0 kBtuh, 94.0 AFUE. 4.0 SEER. 54 EF.			







2009 IECC Resource

Interpretation questions

• Website: http://www.iccsafe.org/cs/Pages/opinions.aspx

Phone: 1-888-ICC-SAFE (422-7233) - ext. 338077

US Department of Energy

Website: http://www.energycodes.gov/help/





Break

15 minutes

We're going to start topic 2 at _____





Topic 2

Tools to Enhance Compliance throughout Permit Review Process and Inspection





Topic 2 Objectives

- Review examples of tools to enhance compliance with the code prior to submittal
- Review the plans review process
- Review the inspections required





Topic 2 Objectives

- Review examples of tools to enhance compliance with the code prior to submittal
 - Pre-application meetings
 - Code determination worksheet
 - Permit submittal checklist
 - Compliance form
 - Energy efficiency certificate





Pre-Application Meetings

- Discuss compliance paths, and review code requirements
- Point applicants to information
- Review common misconceptions
- Identify a point-of-contact, which carries through review process

In lieu of meetings, what other outreach is available?



Use of a "Determination Worksheet"

- Chicago Energy Conservation Code Compliance Determination Worksheet
 - Determine compliance requirements
 - Determine occupancy classification
 - General requirements for all projects

Use	the check	boxes below to determine the classification for the project.
YES	NO	Is the building 5 stories or more above grade? If you checked "YES", please complete the Commercial Compliance Form.
		Is the building 4 stories or less above grade <u>and</u> contains any permanent residential occupancy, such as houses, apartments, condos, or dorms (hotel and temporary housing units are not included here)?
		 If you checked "YES", please complete the Residential Compliance Form.
		Is the building 4 stories or less above grade <u>and</u> does it contain any permanent residential occupancy <u>and</u> any other occupancy which occupies more than 15% of the total building area?
		If you checked "YES", please complete the Commercial Compliance Form as well as the Residential Compliance Form.





 Use of a checklist for required documents needed for permit submittal

APPLICANT'S INITIALS	VILLAGE VERIFICATION	1. Two set of drawings 2. Site plan detail sheet 3. Foundation detail sheet 4. Floor plans 5. Wall construction detail sheet 6. Floor construction detail sheet 7. Roof/ceiling construction detail sheet 8. Chimney/fireplace & chase detail sheet 9. Mechanical detail sheet 10. Plumbing detail sheet 11. Electrical detail sheet 12. Drainage Certificate Agreement 13. Site Development Permit/Erosion Control 14. Contractor Listing 15. Open Space Disclaimer or Open Space Checklist & Receipts 16. Energy Code Compliance	
Signature of Applica	nt	Date	
Signature of Applica Accepted: Village o		Date	





Tools Prior to Submittal

 Might want a detailed description of what is required for the "Energy Code Compliance"

- Two set of drawings
- 2. Site plan detail sheet
- Foundation detail sheet
- 4. Floor plans
- Wall construction detail sheet
- Floor construction detail sheet
- 7. Roof/ceiling construction detail sheet
- 8. Chimney/fireplace & chase detail sheet
- Mechanical detail sheet
- Plumbing detail sheet
- Electrical detail sheet
- 12. Drainage Certificate Agreement
- 13. Site Development Permit/Erosion Control
- Contractor Listing
- Open Space Disclaimer or Open Space Checklist & Receipts
- Energy Code Compliance





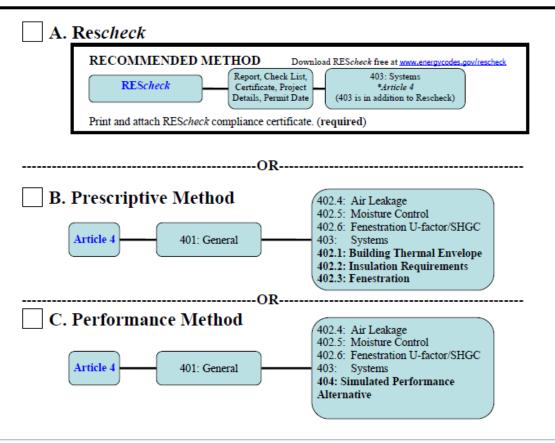


Compliance forms

- Chicago, IL Residential Compliance Form
- Fort Collins, CO Residential Energy Code Compliance Form
- Jefferson County, CO Residential Energy Code Submittal Requirements



Tools Prior to Submittal – Chicago, IL





Tools Prior to Submittal – Chicago, IL

A. Rescheck

RECOMMENDED METHOD

Download REScheck free at www.energycodes.gov/rescheck

REScheck

Report, Check List, Certificate, Project Details, Permit Date 403: Systems *Article 4

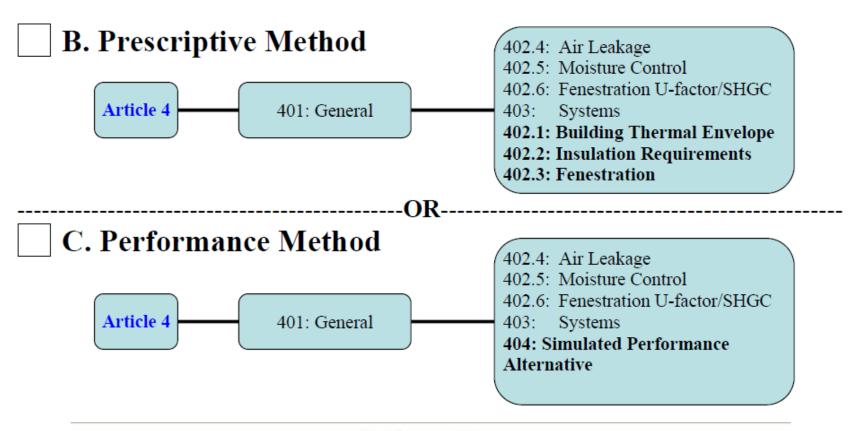
(403 is in addition to Rescheck)

Print and attach REScheck compliance certificate. (required)



ENTRE ZENTES SOURCES MISSOURI DEPARTMENT OF NATURAL RESOURCES

Tools Prior to Submittal – Chicago, IL





Tools Prior to Submittal – Fort Collins, CO

Fort Collins

updated 11-16-201

Planning, Development & Transportation Services

Community Development & Neighborhood Services

2010 FORT COLLINS RESIDENTIAL ENERGY CODE COMPLIANCE FORM

Permit Number:

Address:

DIRECTIONS: Place a check next to Prescriptive, UA, or SPA indicating the path chosen. Next, circle the method within that path you intend to follow. If choosing prescriptive or UA, the applicant must also choose between an Air sealing checklist or Blower Door Test.

(A)PRESCRIPTIVE compliance for house, 2009 IRC, section N1102.1, climate zone 5.

BUILDING ENVELOPE	INSULATION R-VALUE
Wood frame wall insul r-value	R-20 or 13+5ci
Metal frame wall insul r-value	R-13+9ci or R-19+8
Crawl space wall	R-13 or R-10ci
Roof insulation in attic	R-38
Roof rafter insulation	R-30
Walls below grade	R-13 / R-10ci
Wood floor over un-cond	R-30
Slab on grade floor, unheat	R-10, 24" DEEP
Windows	U35

Circle one:

Air Sealing Checklist

Blower Door Test

(B)TOTAL UA ALTERNATIVE (ResCheck), 2009 IRC, SECTION N1102.1.3

Submit a passing UA calculation (i.e. ResCheck) using 2009 IRC/IECC. The rating must be submitted at time of application and must include address of residence; name of includual completing the rating form; name & version of software tool (i.e. ResCheck). Alf Sealing Checklist or Blower Door Test is required.

Circle one:

Air Sealing Checklist

Blower Door Test

(C)SIMULATED PERFORMANCE ALTERNATIVE, 2009 IECC, SECTION 405

Current accredited programs: E-star of Colorado or Energylogic

HERS accredited energy rating system. **Must submit HERS index of 100 maximum**. A preliminary rating must be submitted at time of application and must include Address of residence; Name of Individual completing the rating/compliance form; Name & version of software tool. Final rating requires a blower door test.

SIGN: DATE:

CONTRACTOR: PHONE:







Tools Prior to Submittal – Fort Collins, CO

Option (A) - Prescriptive

- Simple specific to the exact climate zone
- Could include the U-Factor values as an option

BUILDING ENVELOPE	INSULATION R-VALUE
Wood frame wall insul r-value	R-20 or 13+5ci
Metal frame wall insul r-value	R-13+9ci or R-19+8
Crawl space wall	R-13 or R-10ci
Roof insulation in attic	R-38
Roof rafter insulation	R-30
Walls below grade	R-13 / R-10ci
Wood floor over un-cond	R-30
Slab on grade floor, unheat	R-10, 24" DEEP
Windows	U35





Tools Prior to Submittal – Fort Collins, CO

Option (B) – UA Alternative

(B)TOTAL UA ALTERNATIVE (ResCheck), 2009 IRC, SECTION N1102.1.3

Submit a passing UA calculation (i.e. ResCheck) using 2009 IRC/IECC. The rating must be submitted at time of application and must include address of residence; name of individual completing the rating form; name & version of software tool (i.e. ResCheck). Air Sealing Checklist or Blower Door Test is required.

Circle one:

Air Sealing Checklist

Blower Door Test

Option (C) – Simulated Performance Alternative

(C)SIMULATED PERFORMANCE ALTERNATIVE, 2009 IECC, SECTION 405

Current accredited programs: E-star of Colorado or Energylogic

HERS accredited energy rating system. Must submit HERS index of 100 maximum. A preliminary rating must be submitted at time of application and must include Address of residence; Name of individual completing the rating/compliance form; Name & version of software tool. Final rating requires a blower door test.



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Tools Prior to Submittal – Jefferson County, CO

Residential Energy Code Submittal Requirements

The Jefferson County Division of Building Safety has adopted the 2009 International Codes effective January 1, 2010. Included as part of this adoption are the International Residential Code (IRC), and the International Energy Conservation Code (IECC). The IECC contains specific design and submittal requirements. The submittal requirements for residential energy compliance are outlined below as determined by the Division.

Energy code submittals shall be required for all residential projects in accordance with the applicable provisions of the 2009 IRC and 2009 IECC. There are four design path options available to the designer.

- Option #1: Prescriptive path as outlined in IRC Chapter 11
- Option #2: Total UA Alternative path (trade-off) as outlined in IRC section N1102.1.3 & IECC 402.1.4
- Option #3: Simulated Performance Alternative (Performance) path as outlined in IECC section 405
- Option #4: A Professional Design

Note: All four options have similar requirements for submittal documents to meet the code requirements including:

- Building envelope information
- A Manual J equipment design in accordance with the IRC section M1401.3
- A Manual D duct design in accordance with the IRC section M1601.1



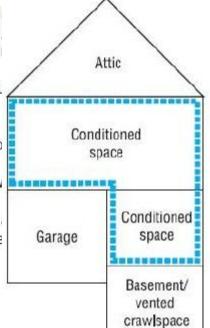
Tools Prior to Submittal – Jefferson County, CO

Option #1 Prescriptive Path

The Prescriptive Path requirements for the building envelope are found i 2009 IRC. Unincorporated Jefferson County is located in Climate Zone 5 & Table N1102.1. All prescriptive information shall be taken from the va Zone 5 requirements.

The Prescriptive Building Envelope submittal shall include, at the minimulinformation on the submitted plans.

- Address of the building (this is a site specific submittal)
- Define/ Delineate your Building Thermal Envelope (this informatio on the plans rather than a separate document)
- Insulation materials; R values denoted for each individual area (w over garage, etc.)
- Crawl space insulation for structural floors and other crawl space whether the foundation wall or the structural floor system is to be requirements of section N1102.2.9)
- Fenestration U factors 402.3
- Duct sealing and insulation, 403.2
- Manual J, specific to the site
- · Manual D duct design, specific to the building
- Lighting equipment 404.1
- Specific insulation 402.2







All projects should include:

- Air sealing details to limit air infiltration
- Air barrier and insulation notes (air barriers at all installed insulation)
- Duct sealing notes, note that no stud cavity shall be used as a supply duct, and possibly duct insulation notes
- Mechanical equipment details (type, efficiency, venting, location, etc.)
- Statement requiring a energy certificate to be installed on or near the electrical panel



Prescriptive Pathway

- Mandatory notes
- Insulation schedule
- Wall Sections specifying insulation
- High-efficacy lighting

Efficiency Schedule

EIIIC	iency schedule			
Energy Details - Climate Zone 4				
2009 IECC Compliance - Prescriptive				
Basement Walls	2x4 with R-13 cav. (FB)			
Above Grade Walls	2x6 with R-20 cav (BC)			
Floor Over Garage	11.875" TJ with R-43 cav (BC)			
Ceiling - Attic	R-50 (BC)			
Windows	All U-Factors equal or below 0.30			
Lighting	-			

FB - Fiberglass Batt (R-3.7/inch)

BC - Blown Cellulose (R-3.66/inch)



U-Factor Pathway

- Mandatory notes
- Insulation schedule
- Wall Sections specifying insulation
- High-efficacy lighting

Efficiency Schedule

	,			
Energy Details - Climate Zone 4				
2009 IECC Compliance - Prescriptive/U-Factor				
Basement Walls 2x4 with R-13 cav (FB)				
Abovo Crado Walls	2x4 with empty cav and 2" of PI			
Above Grade Walls	Foam on exterior [U-Factor - 0.059]			
Floor Over Garage	11.875" TJ with R-43 cav (BC)			
Ceiling - Attic	R-50 (BC)			
Windows	All U-Factors equal or below 0.30			
Lighting 75% or more to be CFL				

FB - Fiberglass Batt (R-3.7/inch)

BC - Blown Cellulose (R-3.66/inch)

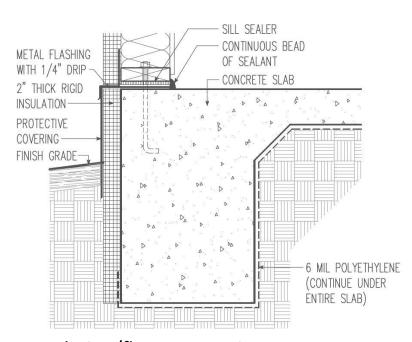
PI - Polyisocyanurate Rigid Foam (R-6.25/inch)

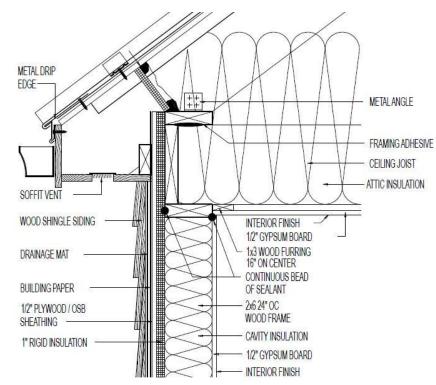


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Tools Prior to Submittal

Example Building Sections





Foundation/floor connection

http://www.greenbuildingadvisor.com

Wall/roof connection





UA Alternative Pathway

- REScheck Compliance Certificate
- Wall Sections specifying insulation
- Detail specifying high-efficacy lighting









Simulated Performance Pathway

- Compliance Certificate
- Wall Sections specifying insulation



Project Title: Jefferson City Home

 Energy Code:
 2009

 Location:
 Jeffer

 Construction Type:
 Single

 Building Orientation:
 Bldg.

 Conditioned Floor Area:
 3508

 Glazing Area Percentage:
 18%

 Heating Degree Days:
 5302

 Climate Zone:
 4

2009 IECC Jefferson City, Missouri Single Family Bldg, faces 90 deg. from North 3508 ft2 18% 5302

Construction Site: 1234 ABC Lane Jefferson City, MO 65101 Owner/Agent: Designer/Contractor:

Compliance: Passes using performance alternative

Compliance: 5.4% Better Than Code

Assembly	Gross Area or Perimeter	Cavity R-Value	Cont. R-Value	Glazing or Door U-Factor	UA
Ceiling 1: Cathedral Ceiling	779	30.0	5.0		23
Ceiling 2: Flat Ceiling or Scissor Truss	385	25.0	13.0		10
18(-1) O. 18() F 40(0.0	0.0		^

	Annual Energy Cost (\$)	
	2009 IECC	As Designed
Heating:	583	564
Cooling:	96	96
Water Heating:	108	108
SubTotal - Used to Determine Compliance:	788	768
Lights & Appliances:	592	592
Photovoltaics:	-0	-0
Service Charge:	120	120
Total:	1500	1480
M-1		
Window U-Factor Check (per Section 402.5)	NAME OF TRANSPORT	
Window U-Factor (Design must be lower):	0.480	0.300

This home MEETS the annual energy cost requirements and verifications of Section 405 of the 2009 International Energy

PASSES

PASSES

Conservation Code based on a climate zone of 4A. In fact, this home surpasses the requirements by 2.6%.

Name: Signature:

* Design energy cost is based on the following systems: Heating: Fuel-fired air distribution, 64.0 kBtuh, 94.0 AFUE. Cooling: Air conditioner, 48.0 kBtuh, 14.0 SEER. Water Heating: Conventional, Gas, 0.54 EF. Window-to-Floor Area Ratio: 0.10 Code default: Htg: 7.00 Cig; 7.00 ACH50

Home Infiltration per Section 402.4.2:

Duct Leakage per Section 403.2.2:

In accordance with IECC, building inputs, such as setpoints, infiltration rates, and window shading may have been changed prior to calculating annual energy cost. Furthermore, the standard reference design HVAC system efficiencies are set to the "prevailing federal minimum standards" as of January, 2009. These standards are subject to change, and software updates should be obtained periodically to ensure the compliance calculations reflect current federal minimum standards.

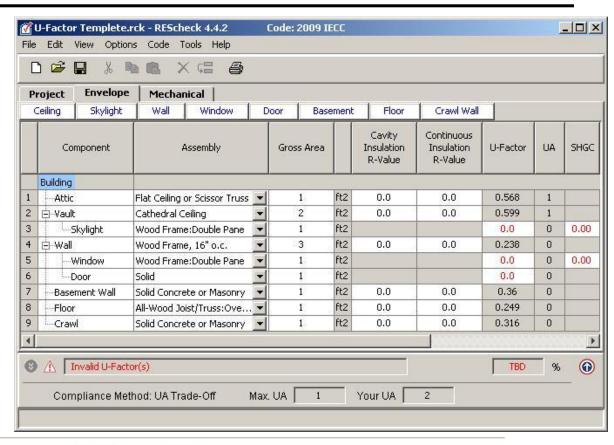






Could use REScheck as a template also

- Automatically calculates the U-Factor of an assembly
- Focus on R-Value or U-Factor of assemblies







Topic 2 Objectives

- Review examples of tools to enhance compliance with the code prior to submittal
- Review the plans review process
- Review the inspections required



Plans Review

Phoenix, AZ has an 10 page review and on the last page is a requirement for the home to meet the energy code – it could be more helpful

ENERGY CODE COMPLIANCE:

- 1) IRC Chapter 11 or
- IECC (Prescriptive or Performance).
 - a) Prescriptive IECC 401, 402, and 403
 - b) Performance based IECC 404



Plans Review

Checklist:

- Defined pathway of compliance
- Mandatory notes included on the plans
 - Duct, air sealing, and air barrier notes
- Compliance is accurate/no inconsistencies
 - REScheck/REM/Manual J/S documents or insulation schedule matches the plan documents
- Fiberglass batts used in 2x6 to meet Climate Zone 5 Requirements
 - Standard batts compressed to fit a 2x6 cavity are rated at R-18 – requires UA Alternative or Simulated Performance Alternative to meet code if using fiberglass batts

- Any unique locations on the plans that might not be clear
 - Unfinished mechanical rooms (still need to be either insulated out of or into the house depending on combustion air)
 - Varying depth of cavity (but schedule states a consistent insulation)
 - Staircase to basement does not allow for 2x4 stud depth at an exterior foundation wall
 - Slab on grade insulation not shown
 - Stud cavity depth does not allow for standard insulation that would meet code







Topic 2 Objectives

- Review examples of tools to enhance compliance with the code prior to submittal
- Review the plans review process
- Review the inspections required





Inspection checklists

- REScheck inspection checklist
- REM/Design inspection checklist
- Georgia Residential Energy Code Inspection checklist
- Department of Energy 2009 IECC checklist:

http://www.energycodes.gov/arra/compliance_evaluation.stm



Required Inspections:

Insulation:

- Insulation (to be covered) is sufficient and installed correctly
- Air sealing completed
- Installed insulation to have air barrier (thermal bypass)
- Possible duct testing verification

Final

- Remaining insulation is inspected
- Ducts are fully located in conditioned space or insulated
- Verify an accurate final certificate is posted near electrical panel
- Possible duct testing verification
- Possible whole house air infiltration testing or checklist verification







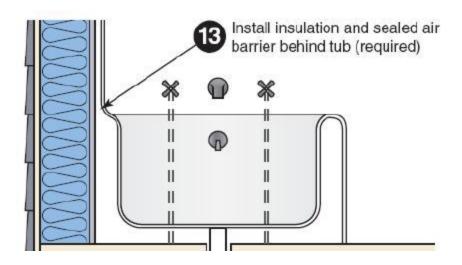
Thermal Bypass -

"Exterior thermal envelope insulation for framed walls is not installed in substantial contact and continuous alignment with building envelope air barrier."





Common air barrier/insulation mistakes



http://www.dca.state.ga.us/development/constructioncodes/programs/documents/IECC2011Ame ndments-effective_001.pdf





Common air barrier/insulation mistakes



B. No rigid air barrier is installed behind fireplace.



Rigid air barrier is installed behind fireplace.

http://www.energystar.gov/ia/partners/bldrs_lenders_raters/downloads/Energy_Star_v3_TERC_Guidebook.pdf

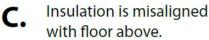


HISSOURI DEPARTMENT OF NATURAL RESOURCES

Inspections

Common air barrier/insulation mistakes







Insulation is in contact with floor above.

http://www.energystar.gov/ia/partners/bldrs_lenders_raters/downloads/Energy_Star_v3_TERC_G uidebook.pdf



HISSOURI DEPARTMENT OF NATURAL RESOURCES

Inspections

401.3 Certificate. A permanent certificate shall be posted on or in the electrical distribution panel... shall be completed by the builder or registered design professional...shall list the predominant *R*-values of insulation installed in or on ceiling/roof, walls, foundation (slab, *basement wall*, crawlspace wall and/or floor) and ducts outside conditioned spaces; U-factors for fenestration and the solar heat gain coefficient (SHGC) of fenestration...shall list the types and efficiencies of heating, cooling and service water heating equipment.









Insulation Rating	R-Value	
Ceiling / Roof	30.00	
Wall	33.00	
Floor / Foundation	10.00	
Ductwork (unconditioned spaces):		
Glass & Door Rating	U-Factor	SHGC
Window	0.30	
Door	0.31	NA
Heating & Cooling Equipment	Efficiency	
Heating System:		
Cooling System:		
Water Heater:		
Name:	Date:	
Comments:		



ENTRE ZENTES SOURCES MISSOURI DEPARTMENT OF NATURAL RESOURCES

Inspections

NH Energy Code Certi	ificate 2009 IECC
Insulation Ratings	R-Values
Ceiling / Roof	
Walls	
Floor/ Foundation	
Ductwork (in unconditioned spaces))
Window and Door Ratings	U-Values
Window	
Doors	
Heating Equipment	AFUE or EER
Boiler or Furnace	
Cooling	
Company Name:	
Date: Post On or	Near Electrical Panel

http://www.puc.state.nh.us/EnergyCodes/IECC%202009%20Efficiency%20Label.pdf





APPENDIX D SAMPLE COMPLIANCE CERTIFICATE

Builder/Design Professional:	Phone:
Envelope Summary:	
· List the R-Value for the following component	s:
Flat celling/roof: Exterior wall: Attic kneewall: Basement stud wall: Crawlspace stud wall: Foundation slab: Cantilevered Floor:	Above grade mass wall: Attic kneewall sheathing: Basement continuous: Crawlspace continuous:
Fenestration Components:	80
Window U-factor: Skylight U-factor: Glazed Door U-factor: Building Envelope Tightness (BET):	Window SHGC: Skylight SHGC: Opaque Door U-factor: (<50% glazed)
BET test conducted by:	Phone:
Fan Flow at 50 Pascals= CFM ₅₀ ACH ₅₀ = CFM ₅₀ x 60 / Volume=	Total Conditioned Volume =ft
Low Rise Multifamily Visual Inspection Optio (The visual inspection option may be conducted by a third-p. Visual inspection conducted by:	n arty instead of the BET test for R-2 buildings only.)

CONTRACTOR OF STREET	al Summary:				- Out
	ter Energy Factor:		type: U Gas	Electric	Other
	f Heating and Cooling S				
	stem Type (choose on Gas: AFUE		at Dumn	HSPF	
3.00	Other:		at rump.	narr	
	stem Type (Standard D)	1 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3	mal. etc.):		
	stem Efficiency:		EER EER	Other	
Heating/C	ooling Load Calculation	s Performed by:		Phone:	
Total Heat	ing Load (Based on ACCA M	an. J or other approved met	hadology);	Btu/h	
Total Cool	ing Load (Based on ACCA N	in. I or other approved met	nodology):	Btu/h	
Cooling Se	nsible Load:	Btu/h Cooling	Latent Load	Bt	u/h
	landler CFM (based on o			CFM	
Duct Tight	ness Test Conducted b	v:	P	hone:	
CERA	100 ft ² of conditioned flo	for area = $CFM_{25} \times 10$	0 / Conditione	onstruction duct leaks	ed age to outdoors
If all ducts are (PCO) is ≤ 8 nandler Install	and located within conditioned $cfm/100 \text{ ft}^2$, the post construction $cfm/100 \text{ ft}^2$. State with $cfm/100 \text{ ft}^2$. State within the state of the sta	n total duct leakage (PCT) high method was used to co	is ≤ 12 cfm/100 ft² iduct the duct tight	tness test:	(RIT) with air
If all ducts are (PCO) is ≤ 8 handler Install	$cfm/100 \text{ ft}^2$, the post construction of is $\leq 6 \text{ cfm}/100 \text{ ft}^2$. State where	in total duct leakage (PCT) high method was used to co action method (MBDS), or	is \$ 12 cfm/100 ft? induct the duct tight automated multipo	tness test:	(RIT) with air D).
If all ducts are (PCO) is ≤ 8 handler Install duct blower (I	cfm/100 ft ² , the past construction ed is \leq 6 cfm/100 ft ² . State with DB), modified blower door subtr	in total duct leakage (PCT) high method was used to co action method (MBDS), or	is \$ 12 cfm/100 ft? induct the duct tight automated multipo	tness test; int blower door (AMB	(RIT) with air D).
If all ducts are (PCO) is ≤ 8 handler Install duct blower (I	cfm/100 ft ² , the past construction ed is \leq 6 cfm/100 ft ² . State with DB), modified blower door subtr	in total duct leakage (PCT) high method was used to co action method (MBDS), or	is \$ 12 cfm/100 ft? induct the duct tight automated multipo	tness test; int blower door (AMB	(RIT) with air

"Note: This permanent certificate shall be posted on or in the electrical distribution panel. Certificate shall be completed by the builder or registered design professional. Where there is more than one

value for each component, certificate shall list the value covering the largest area.





MISSOURI DEPARTMENT OF NATURAL RESOURCES

Topic 2 Summary

405.4.3. Additional documentation. The code quicial shall be permitted to require the followin

405.4.1. Compliance software tools. Documentation verifying that the methods and accuracy of the compliance

software tools conform to the provisions of this section shall be provided to the code official.

Documentation of the actual values software calculations for the proposed de details. fficiencies of heating, 3. ervice water heating equipment.

103.2 Information on construction documents. Construction documents shall be drawn to scale upon suitable material. Electronic media documents are permitted to be submitted

when approved by the code official. Construction documents shall be of sufficient clarity to indicate the location, nature and extent of the work proposed, and show in sufficient detail pertinent data and features of the building, systems and equipment as herein governed. Details shall include, but are not limited to, insulation materials and their R-values; fenestra-

> CC: area-weighted *U*-factor and SHGC tem design criteria; mechanical stem and equipment types, sizes description; equipment and sysrsepower (hp) and controls; duct ation and location; lighting fixture control narrative; and air sealing



Topic 2 Summary

- Tools prior to submittal
 - Determination worksheet
 - Compliance forms
 - Permit submittal checklists
 - Certificates
- Tools for plan review and inspection
 - Plans review checklist
 - Inspection checklist





Thank You – comment card

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